Antimicrobial Resistance Management
at
Wilford Hall USAF Medical Center

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Overview

- **Epidemiologically Significant Organisms**
- **Antibiogram**
- **Use of The Surveillance Network (TCN) ®**

Epidemiologically Significant Organisms (ESOs)

How are these defined?

- **Infection Control Department determines based on:**
  - **National (SHEA[1], etc.)**
  - **Regional (South Texas Asso. Microbiology Professionals)**
  - **Local (Medical Center Epidemiology)**

1 *Infect Control & Hosp Epidemiol* 2003; 24(5):362-86

ESOs

How are these defined?

- **MRSA**
- **VRE**
- *Clostridium difficile*
- **MDR GNR's**
  - **Resistant to two of three antibiotic classes**
    - **B-lactams/monobactams/carbapenems**
    - **Aminoglycosides**
    - **Fluoroquinolones**

Epidemiologically Significant Organisms

How Are ESOs Identified?

Redundant procedures

- **New Cases:**
  - Microbiology alerts IC when ESO isolated
  - IC uses active surveillance computer program (Extended Abx Resistance Detection (ERD)), which accesses CHCS culture/sensitivity data
  - Colonized/infected patients "flagged" in CHCS patient data/demographic file
  - IC initiates file/flow sheet for active surveillance
- **Colonized patients re-admitted to WHMC**
  - Admissions Department notifies IC of 'flagged' patients
  - IC uses continues active surveillance

ERD

Extended Antibiotic Resistance Detection

Start Date: 4/ 5/2004   End Date: 4/ 9/2004   Find Resistant Organisms   Find ESBL Results   Print   Exit

Patient Name	FMP/SSN	Culture Date	Source	Organism
PATIENT, 777 44626	77777777777	4/6/2004 2:23:0...	SPUTUM	PSEUDOMONAS AERUGINOSA
		4/7/2004 1:02:0...	SPUTUM	PSEUDOMONAS AERUGINOSA
		4/8/2004 11:55:...	SPUTUM	PSEUDOMONAS AERUGINOSA
PATIENT, 777 58259	77777777777	4/6/2004 2:14:0...	URINE	ESCHERICHIA COLI
PATIENT, 777 121919	77777777777	4/8/2004 10:03:...	URINE	ESCHERICHIA COLI
PATIENT, 777 311490	77777777777	4/6/2004 10:16:...	URINE	ESCHERICHIA COLI
		4/6/2004 10:16:...	URINE	PSEUDOMONAS AERUGINOSA
PATIENT, 777 352179	77777777777	4/5/2004 10:26:...	URINE	ESCHERICHIA COLI
PATIENT, 777 415220	77777777777	4/7/2004 9:33:0...	URINE	ESCHERICHIA COLI
PATIENT, 777 12273689	77777777777	4/8/2004 9:42:0...	URINE	ESCHERICHIA COLI
PATIENT, 777 12805563	77777777777	4/6/2004 5:09:0...	URINE	ESCHERICHIA COLI
PATIENT, 777 13456200	77777777777	4/5/2004 6:01:0...	BLOOD	PSEUDOMONAS AERUGINOSA
		4/5/2004 6:03:0...	BLOOD	PSEUDOMONAS AERUGINOSA
		4/5/2004 7:55:0...	SPUTUM	PSEUDOMONAS AERUGINOSA
		4/7/2004 3:13:0...	TRACHEAL MUCUS	PSEUDOMONAS AERUGINOSA
PATIENT, 777 13473921	77777777777	4/7/2004 4:15:0...	URINE	ESCHERICHIA COLI

Developed at WHMC in conjunction with Information Management
Extracts CHCS reports: ESOs

Culture Details ▢ ▢ ✕

Patient Name

FMPSSN

Lab Accession Name

040819 BTW 2979

Collection Date/Time

8/19/2004 10:46:00 PM

Specimen Source

SPUTUM

Organism

PSEUDOMONAS AERUGINOSA

☑ Save in DB

Antibiograms

Antibiotic Group	Antibiotic	R/I/S/X
Group A	CEFTAZIDIME	R
	CEFEPIME	R
	MEROPENEM	R
	PIP/TAZOBACTAM	R
	IMIPENEM	R
	AZTREONAM	R
	CEFEPIME	X
Group C	CIPROFLOXACIN	R
	LEVOFLOXACIN	R
	GATIFLOXACIN	X
	MOXIFLOXACIN	X
	GATIFLOXICIN	X

Done

Epidemiologically Significant Organisms

Defining and Engaging Outbreaks

- **Cluster defined as 3 or more cases in the same geographic location within 30 days**
- **Outbreak defined as greater than expected incidence**
- **Rising Endemic Rates**

Epidemiologically Significant Organisms

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Epidemiologically Significant Organisms

Assessing for Rising Endemic Rates of ESO's

- Assess patient location in facility to rule out cluster

- Assess antibiotic usage

- Assess patient population for susceptibility for organism

- Assess use of Prevacare with C. diff patients

Nosocomial C-diff 2003-2004
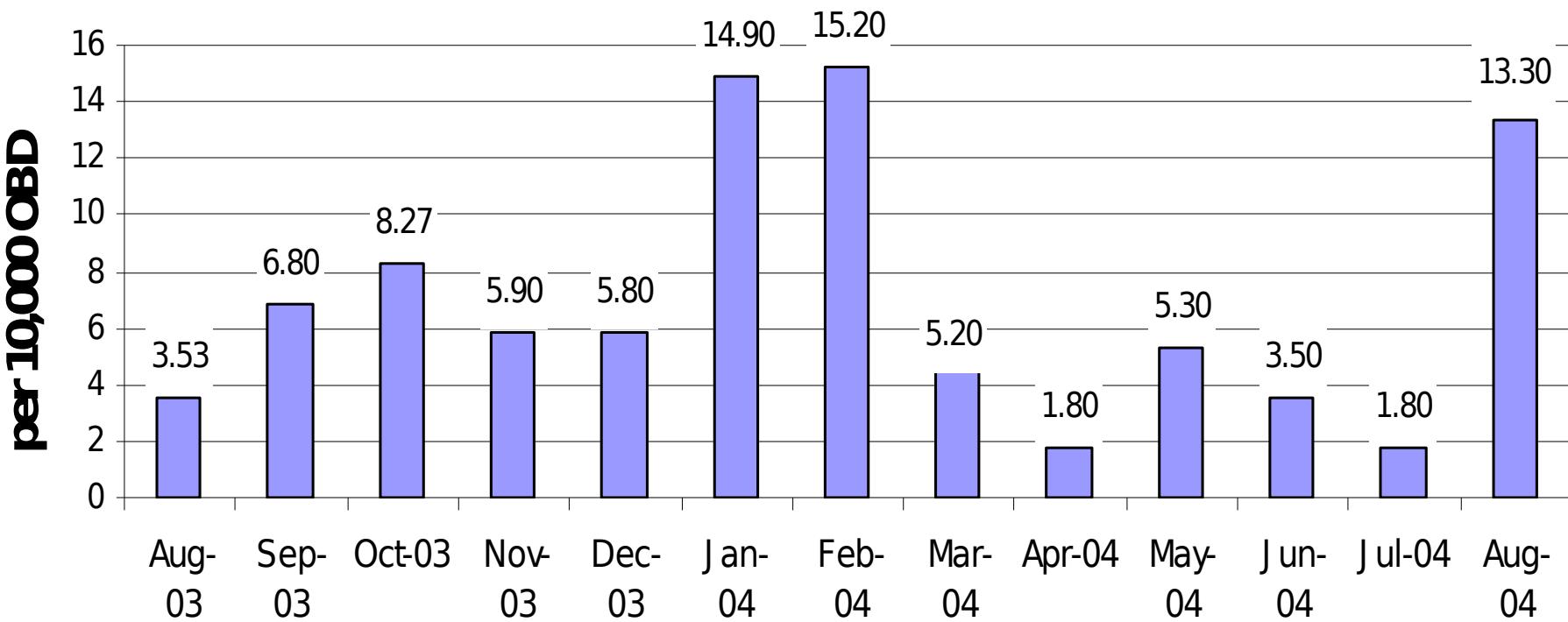
C diff Jan 03 - Aug 04
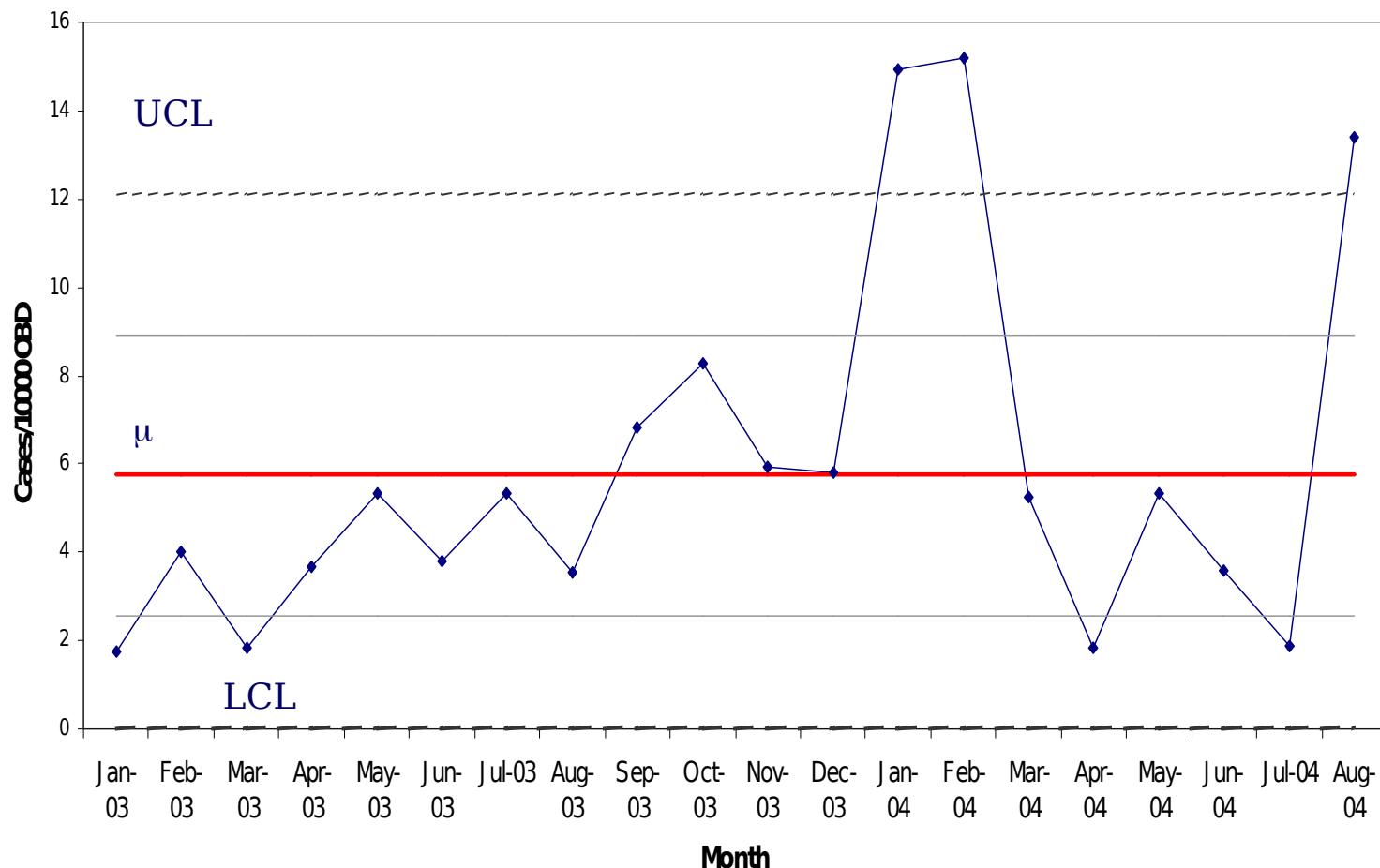
Antibiogram

- **Patterned after UTHSCSA antibiogram, which is overseen by Dr. Jorgensen, former chair of NCCLS**

- **Principles:**
  - **Percent susceptible expressed**
  - **Inpatient separated from outpatient**
  - **Organisms included only if >10 isolates in previous 12 months**
  - **Some bug-drug combinations censored**
  - **New version every 6 months, always based on previous 12 month data**

Wilford Hall Medical Center

01 May 2003 - 30 Jun 2004

In-Patient

% Susceptible

Printed annually-Updated electronically every 6 months on WHMC Intranet under P&T

Antibiotic	Acinetobacter baumannii (10)	Citrobacter freundii (n=15)	Enterobacter aerogenes (n=20)	Enterobacter cloacae (n=44)	Enterococcus spp. (n=110)	Escherichia coli (n=174)	Haemophilus influenzae (n=20)	Klebsiella oxytoca (17)	Klebsiella pneumoniae (n=85)	Proteus mirabilis (n=31)	Pseudomonas aeruginosa (n=122)	Serratia marcescens (12)	Staphylococcus aureus (n=237)	Staphylococcus spp Coag-Neg (n=148)	Stenotrophomonas maltophilia (n=28)	Streptococcus pneumoniae (n=24)
Amikacin (Amikin)	90	100	100	100						100	93	100			36	
Amoxicillin/Clavulanate (Augmentin)		0	0	0		73		94	96	96		0				
Ampicillin		0	0	0	91	50	70	0	0	74		0				
Amp/Sulbactam (Unasyn)													56	28		
Cefazolin (Ancef)		0	NR	NR		85		71	95	94		0	56	28		
Cefepime (Maxipime)			NR	NR			100				63				11	
Cefixime			NR	NR			100									
Cefotaxime (Claforan)			NR	NR			100					25				88
Cefotetan		86	NR	NR		100		100	99	100		100				
Ceftazidime (Fortaz)	90	86	NR	NR		98		94	99	100	79	83				
Ceftriaxone (Rocephin)	10	83	NR	NR						100	16	100				
Cefuroxime							95									
Ciprofloxacin (Cipro)**	60	100	100	95	67	83		94	98	82	77	100	59	44	28	
Clindamycin (Cleocin)													62	50		
Erythromycin													54	38		33
Gentamicin (Garamycin)	40	100	100	96		90		88	100	100	63	83			35	
Imipenem (Primaxin)***	90	100	100	100		100				100	86	100			0	
Levofloxacin (Levaquin)**	60	100	100	95		83		94	95	81	76	100				
Nitrofurantoin (Macrodantin)				82	96	98		83	78	0		0				
Oxacillin (Prostaphlin)													56	28		
Penicillin G					89											38
Pip/Tazobactam (Zosyn)	80	87	80	82		94		94	93	100	94	92			0	
Tetracycline (Achromycin)^^					35		75						97	85		
Tobramycin (Nebcin)	80	92	100	97						100	89	67				
Trimeth-Sulfa (Septra)	60	100	100	93		76	75	88	93	77		100	97	63	100	
Vancomycin (Vancocin)					98								100	100		100

NR: Drug not recommended due to intrinsic resistance---**Consider Gatifloxacin ***Consider Meropenem

^^Consider Doxycycline   (Not tested but % susceptible predicted to be equal to or greater than that for tetracycline)

NCCLS guidelines used; only 1 patient isolate per year counted; data for <10 isolates not reported

The Surveillance Network TSN ®

- **Focus/MRL, Inc.**
  - **www.mrlworld.com**
- **Internet-based computer support for laboratory-based surveillance**
  - **Over 500 participating sites-USA, Canada, Europe, Australia**
- **Capture, manage, store data**
  - **Incidence by numbers of isolates**
  - **Percentage of resistant isolates**
  - **Resistance trending analysis**
  - **Sorting Capabilities:**
    - **Specimen type, age, gender, location**
  - **Data Comparison**
    - **Hospital trends, region, or national database**

TSN

- **CHCS Interface**
  - **C&S reports sent automatically daily**
  - **HIPAA Compliant: Unique patient identification number unrelated to SSN**
  - **Pt location (outpt, ward, ICU), body site**
  - **Institutional data is secure**
  - **Feedback:**
   - **If report not recieved**
   - **QC filters**

TSN Query Example
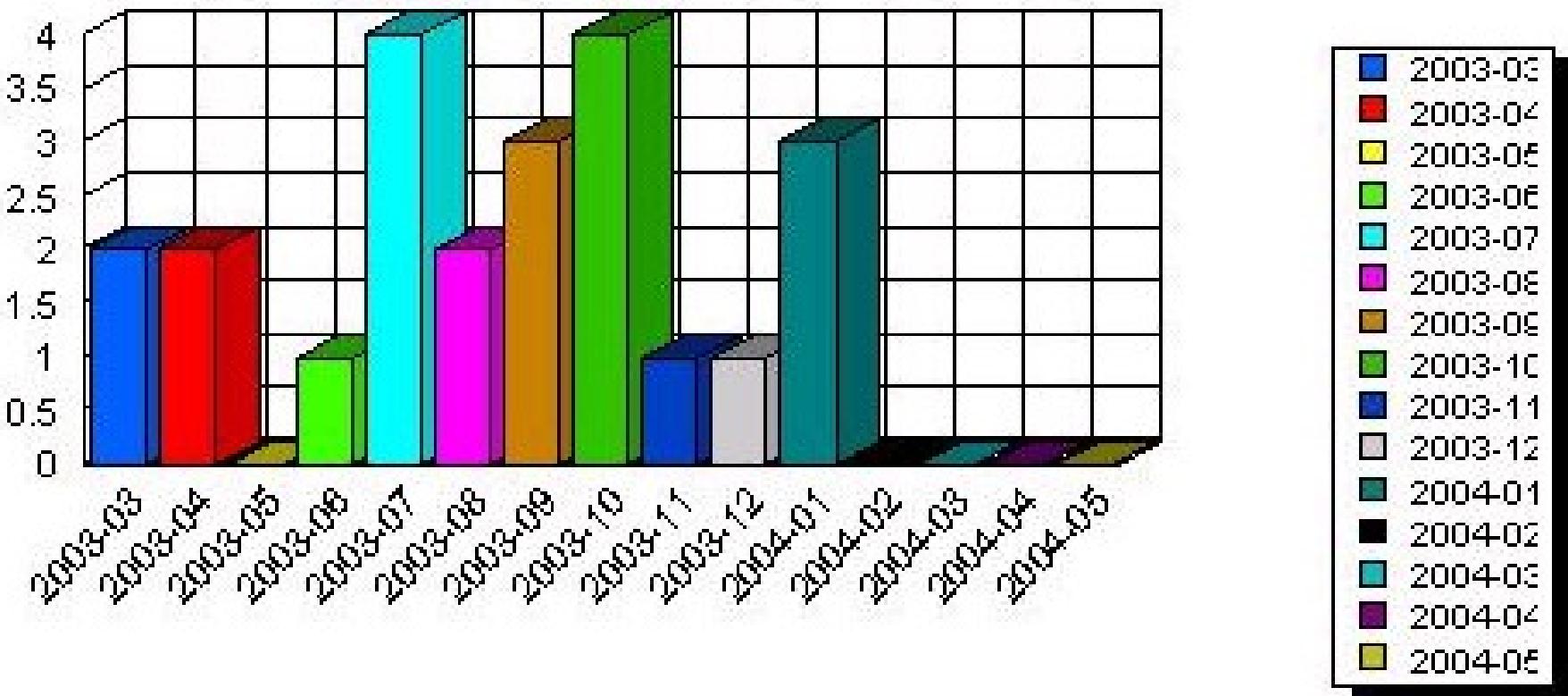
Percent VRE Including all Isolates at WHMC


Legend:
- Inpatient
- Inpatient ICU
- Outpatient

Overprint Intervention:

Before: 15.8%

After: 11.0%

Odds ratio=1.51 (0.85-2.69), P=0.131 using Mantel-Haenszel Chi-square test

X-axis labels: Jan, Mar, May, July, Sept, Nov, Jan, Mar

Y-axis: 0 to 100
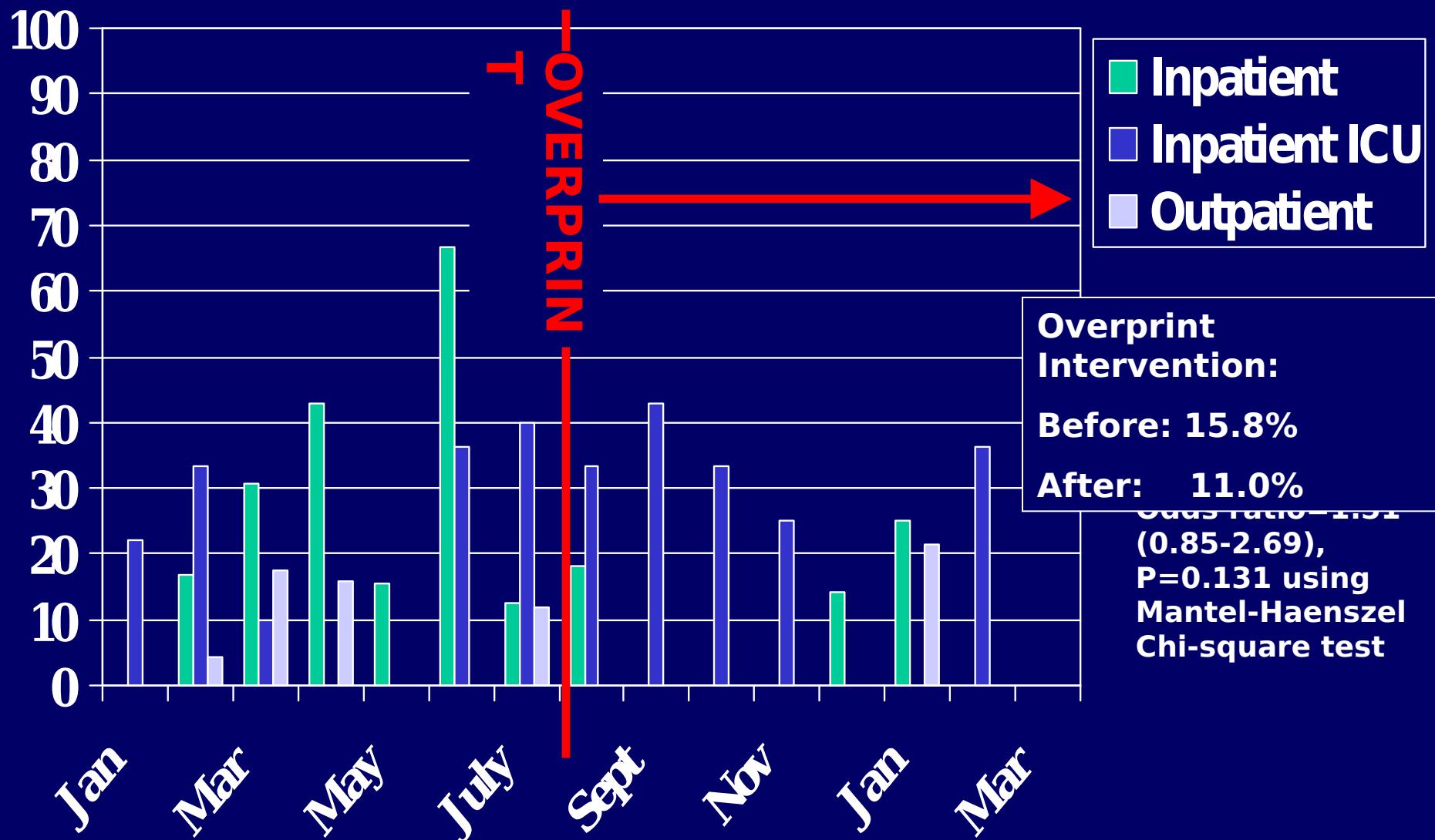
Percent VRE Inpatient Isolates Only (Ward + ICU)

OVERPRINT

Overprint Intervention:

Before: 25.6%

After: 19.1%

Odds ratio=1.46 (0.75-2.87), P=0.236 using Mantel-Haenszel Chi-square test
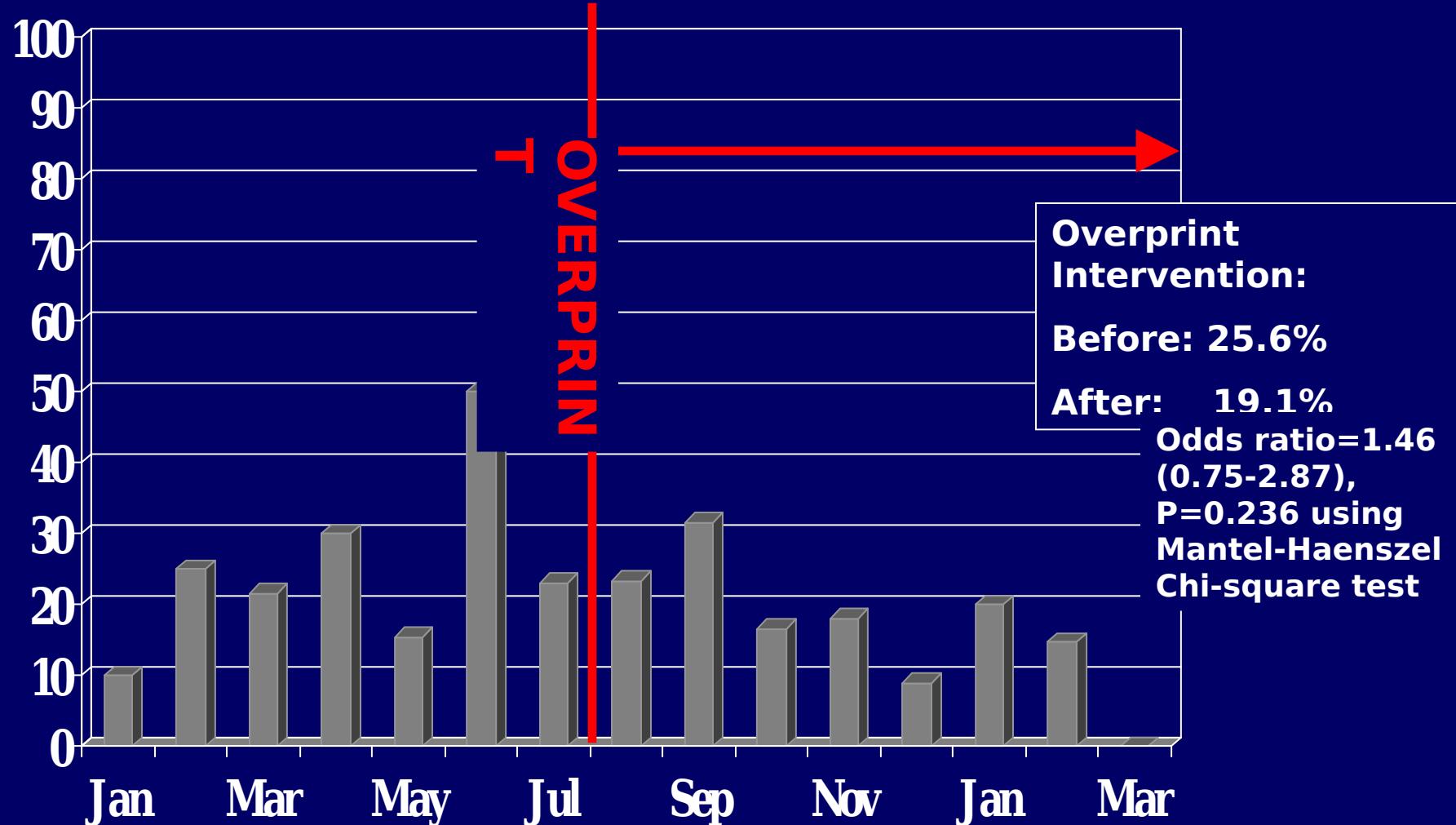
Percent VRE Inpatient Ward Only

OVERPRINT

Overprint Intervention:

Before: 27.0%

After: 8.5%

Odds ratio=4.00 (1.29-13.21), P=0.00672 using Mantel-Haenszel Chi-square test
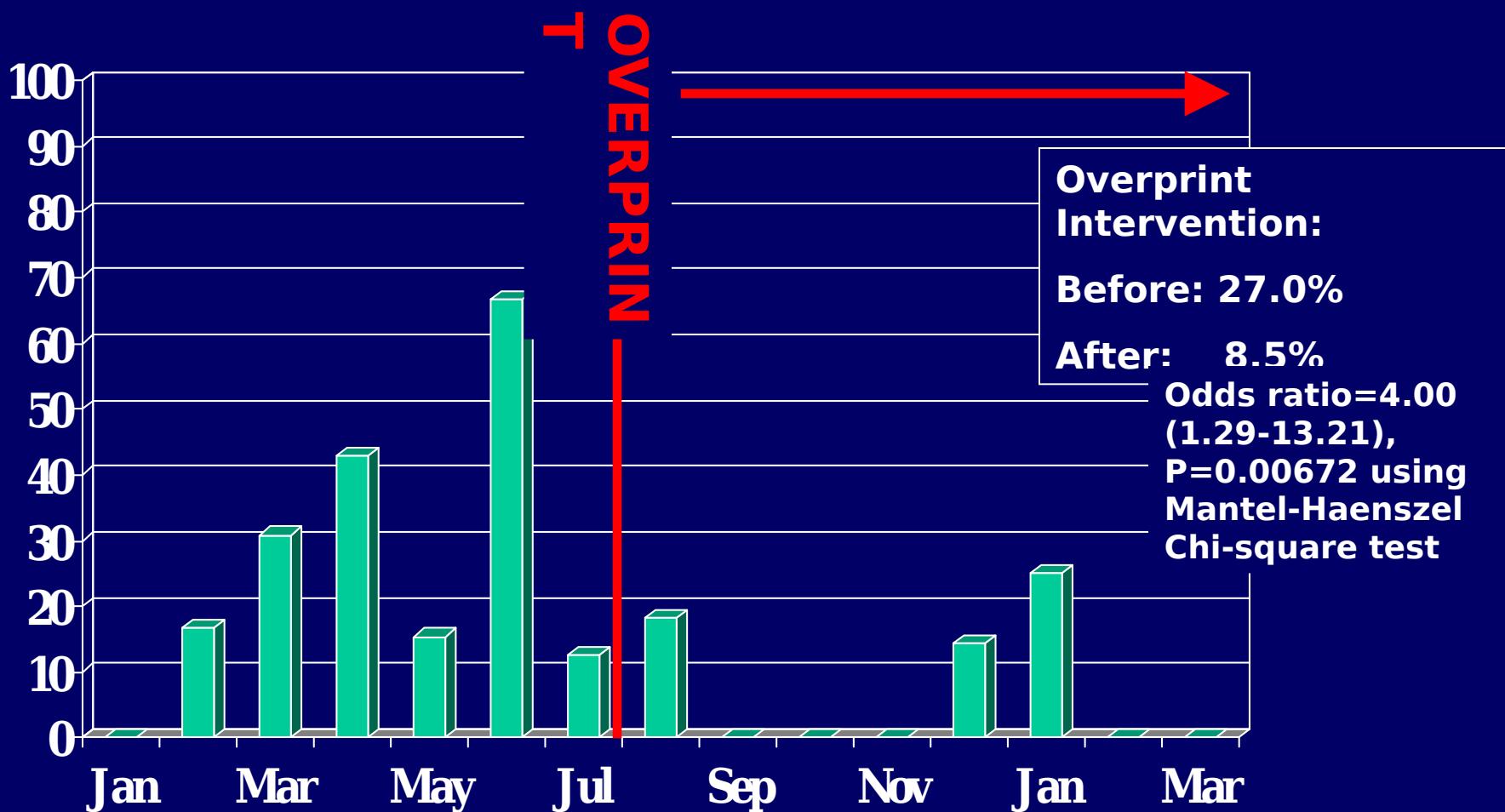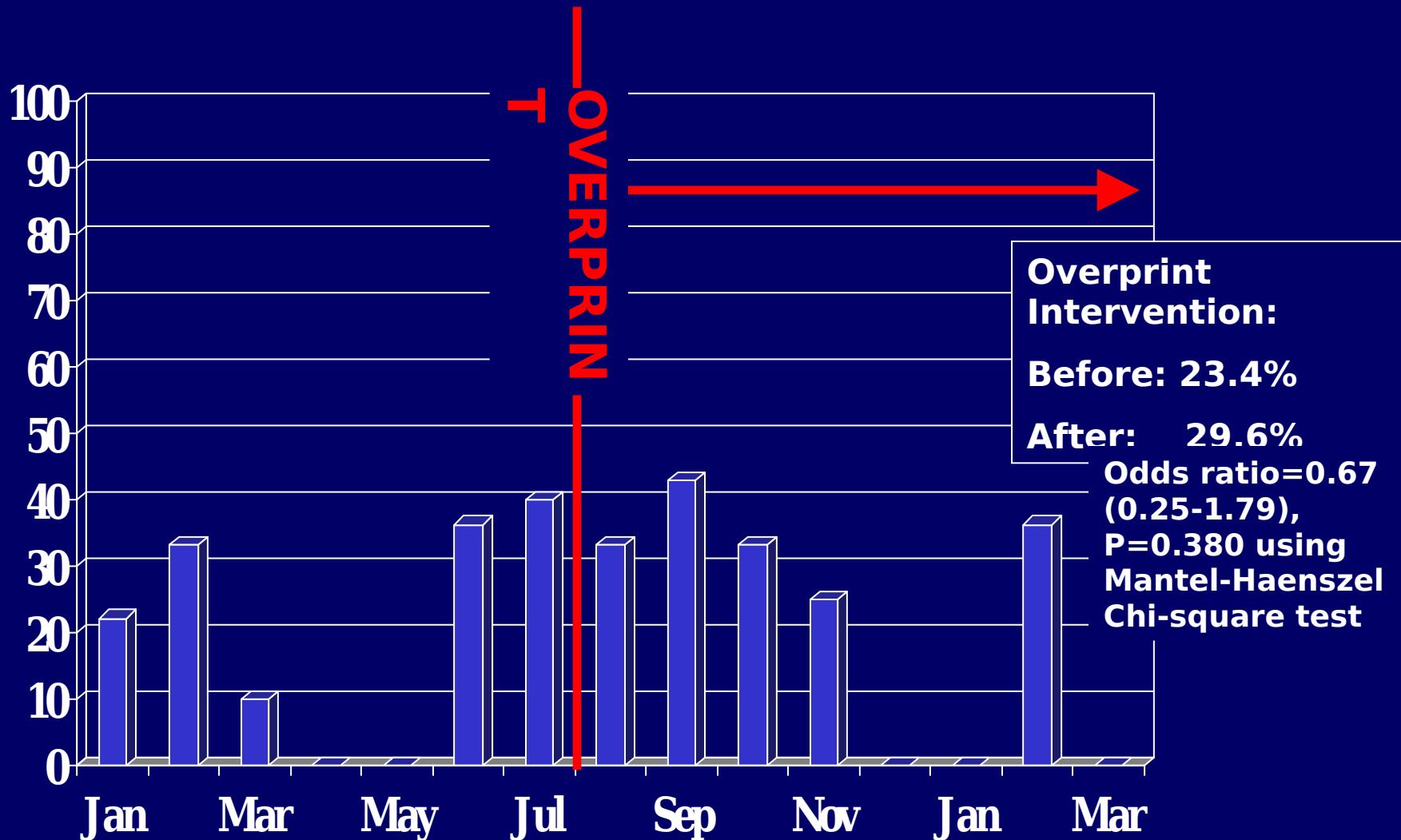
Number of VRE Including all Isolates
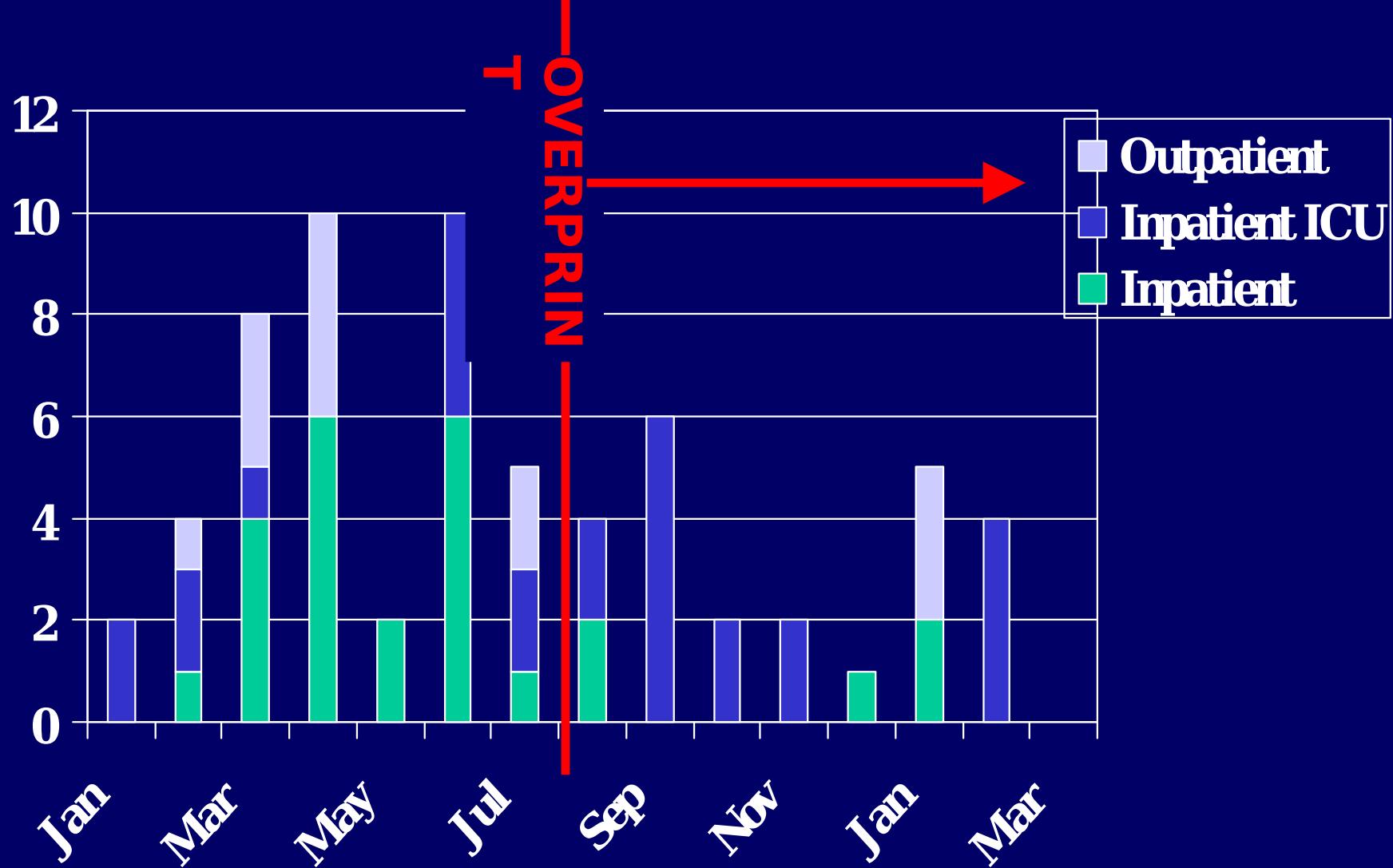
Nosocomial VRE per 10,000 Occupied Bed Days
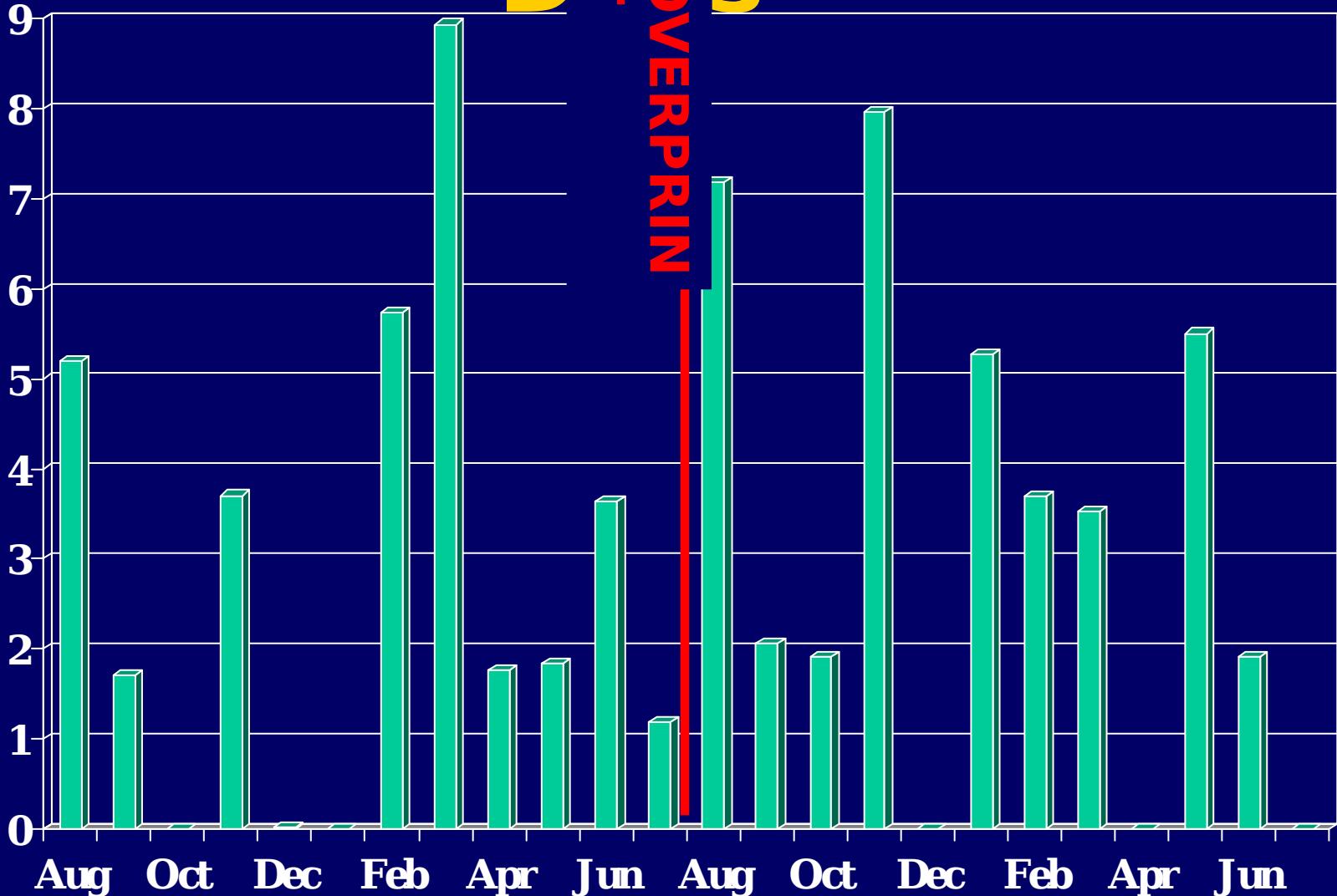
Identification

- New isolates
  - Microbiology notifies the inpatient unit and Infection Control
  - IC "tags" the patient in CHCS
- Previously identified
  - Admissions notifies IC and the inpatient unit
- Infection Control contacts the inpatient unit to ensure contact precautions initiated

Questions/Comments?